THEORY AND PRACTICE IN INTRODUCTORY AVALANCHE EDUCATION

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ABSTRACT: This study examines how students experience an AIARE Level 1 avalanche course. How do they describe their experience? What motivated them to take the course, what did they think the course was about, and what did they value? How do they talk about decision making, risk and learning before and after the course? Participants' responses indicate a desire for a pragmatic, hands-on learning experience, and while participants report positive outcomes, they also describe a dilemma with regard to their experience of the course, suggesting that perceived gains might be limited. A comparative lens locates this dilemma between differing theoretical models, indicating the need for further examination of the theory and practice of avalanche education

KEYWORDS: avalanche education, human factor, experiential learning

1. INTRODUCTION

As backcountry recreation continues to grow in popularity, avalanche fatalities have not tracked at the same rate, suggesting that education, forecasting, and other interventions are positively impacting behavior and decision making. However, analysis of accident reports in previous studies correlates increased risk exposure with the attainment of avalanche training, suggesting that while education increases mobility, it may not impact decision making (McCammon, 2000, 2004).

Given these findings and in order to better understand the current practice of avalanche education, this study examines students' interpretation of their experience in a typical introductory course. What motivated them to take the course, what did they gain from the course, and what did they value? How do students talk about decision making, risk and learning before and after the course? Following an inductive, qualitative approach, this study frames the role and influence of avalanche education and examines the impact of underlying theoretical models on student outcomes.

2. THEORY

2.1 Behavioral economics in snow science:

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The evolution of the human factor

The identification of decision error as the primary cause of avalanche accidents (McCammon, 2004; Atkins, 2000) set the stage for the development of the "human factor" concept within the field of snow science and avalanche research. This essential turn in the literature established that decision making errors are seldom due to a lack of information, rather they are the result of how information is processed (Atkins, 2000). The sense was that avalanche accidents were happening in systematically predictable ways, and experienced backcountry travelers were falling victim to what appeared to be, in hindsight, avoidable errors.

In a broader context, the concept of the human factor first emerged in the field of behavioral economics. Researchers made the case that decision making error was due to systemic faults within our cognitive machinery, rather than willful misrepresentation or illogical emotional processing (Tversky & Kahnemann, 1982). Within this model, cognitive faults were due to "system 1" thinking, which is characterized by heuristic processing, expertise and intuition, i.e. "fast" thinking (Kahnemann, 2011). The automatic and mostly unexamined nature of system 1 allows experienced individuals to miss or misinterpret seemingly obvious environmental input (Kahnemann, 2011). System 2, on the other hand, engages deliberate, slow thinking that eschews familiarity or representative models (Kahnemann, 2011). Researchers working in nudge theory take the cognitive model a step further, arguing that due to the short-comings of system 1, "choice architects" have a responsibility to engineer environments in order to steer decision making (Thaler & Sunstein, 2009).

As did researchers in many fields, snow scientists leveraged these models within behavioral economics to explain seemingly irrational behavior; systemic cognitive error offered a reason as to why educated, experienced backcountry travelers would seemingly ignore red flags (Atkins, 2000; McCammon, 2000, 2004). However, while the human factor is now seen as a key component to understanding decision making in the backcountry, the normative position underlying the cognitive error model has critical, relatively unexplored implications in terms of backcountry education.

2.2 *Experiential learning theory and adventure education: An alternative model*

Building on the tradition of pragmatist philosophers such as Dewey, Follett, Piaget and James (Kolb, 2015), Experiential Learning Theory (ELT) offers an alternative model for conceptualizing decision making. Where behavioral economists question why an individual's decision making does not reflect objective reality, ELT scholars argue that behavior and reality are reflections of one another. So where the underlying position in a cognitive model might encourage a distrust of "fast" perception, which must be mediated by certain tools or nudges, ELT holds that our experience, both fast and slow, is an integral component to learning and that our ability to transform (e.g. change our behavior) is the result of our capacity to experiment with and critically engage all aspects our experience, both direct and conceptual (Kolb, 2015). In ELT, an iterative cycle of experimentation enables a student to grasp and transform information into knowledge and action (Kolb, 2015).

Using an ELT approach, researchers in adventure education have uncovered certain pedagogical pitfalls, which may apply to an avalanche education setting as well (Schumann & Millard, 2012; Wurdinger, 1997). To start, researchers point out that transformative experiential education does not simply take place when students "use their hands"; unless the experience requires reflection and problem solving, learning is most likely not taking place (Wurdinger, 1997). Researchers have also identified the development of self-efficacy as a problematic learning outcome within adventure courses (Schumann & Millard, 2012). Self-efficacy can be defined as what "people believe they can do with their skills and abilities amidst conditions where circumstances are ambiguous or unpredictable" (p. 98). Performing tasks out of context and experiencing the reward of a class but not the risk of the activity creates conditions for confidence that may not align with actual skill level (Schumann et al., 2014).

The implication for such an illusion within the context of avalanche terrain is particularly alarming. Overall, an ELT lens has encouraged adventure education researchers to question how and what counts for experiential learning and to cautiously examine course outcomes given the high-risk environments in which students will later test out what they believe they know.

Behavioral economics suggests that through careful management of cognition, we can align our behavior more closely with an external reality, while ELT holds that behavior and reality are simultaneously constructed, and we learn through engaging our experience. These differences have significant implications for how researchers and practitioners understand behavior and education. Given this, investigating how students experience an AIARE level 1 represents an important next step in avalanche education research. How do students describe the experience of an AIARE Level 1? What motivated them to take the course, what did they think the course was about, and what did they value? How do they talk about decision making, risk and learning before and after the course? From this, we can gain insight into what function the Level 1 serves for students and the backcountry community. Does it align with a particular normative position? And is this position an appropriate lens through which to address education and decision making in the backcountry?

3. METHOD

This study follows a qualitative approach with the objective of exploring the details and significance of how participants describe their experience in an AIARE Level 1 course. Through analyzing participants' description of the course, this study aims to provide insight into what a Level 1 means to participants while also uncovering potential theoretical significance.

3.1 *Research Design*

Participants completed semi-structured interviews before and after taking the AIARE Level 1 course. The pre-course interview asked participants to describe their skiing and backcountry experience, their motivation for taking the course, their learning objectives and their approach to risk. The post-course interviews revisited all of the same questions and asked participants to describe any recent touring experiences and to engage in a scenario question (in case the participants had not toured by the time of the interview). Participants were also asked to evaluate their experience of the course, to

describe what they feel they gained and what they felt was the most enjoyable. The interview concluded by asking if participants had any suggestions for AIARE.

3.2 Sample

The sample used for this study was purposive, as it was important to ensure participants were backcountry recreationists or potential backcountry recreationists about to take an AIARE Level 1 course. AIARE provided the contact information for 20 course providers, 5 of whom provided the contact information for 231 students. 26 of these students completed the pre-course interview and 20 persisted to the post-course interview.

4. ANALYSIS

As is common in inductive analysis, coding was performed in several cascades involving the separation, connection and summary of data into increasingly detailed concepts, which eventually connected to theoretical roots.

Three rounds of coding followed two basic approaches: in vivo coding in order to capture the participants' own language and initial coding in order to break the data down into discrete parts and discern similarities and differences. From the parent nodes of "pre" and "post," the child nodes of "learning objectives," "motivation," and "outcomes" were developed, and conceptual categories within grandchild nodes were refined through focused coding. "Awareness of risk - worldview" and "behavior" emerged as additional parent nodes from which child nodes were developed and plotted against the classification of "pre" and "post".

To connect the phenomena uncovered in the coding process, a cognitive map depicting the learning experience of participants was also developed. The map presents, in flow-chart format, an account of how participants explain what and how they learned. The relationships and structures within this map were then related back to models within behavioral economics and ELT.

5. RESULTS

5.1 How do participants describe the experience of the course?

Participants describe their backcountry skills, abilities and overall awareness as being positively impacted by the AIARE Level 1 course; but the manner in which they describe their learning experience suggests a disconnect between the grasping and transforming aspects of the experiential learning cycle (Kolb, 2015). Participants explain their experience in terms of a duality. They say that they are more aware, but unsure of their decision making abilities; they express that they gained skills, but that they need more experience in order to understand what they know. In this duality, participants describe that they were able to grasp but not transform their experience into knowledge.

5.2 What motivated participants to take the course, what did they think the course was about, and what did they value?

Participants were motivated to take the course to gain confidence, to access more terrain and to attain status within their touring groups, and they feel that these objectives were met. However, many felt that they were shut down when they pursued their interest in snow analysis during the course and pointed out missed learning opportunities in the form of deeper interaction with the instructor. While they expressed awareness of the human factor and group dynamics issues, several reported that they were unable to overcome such problems when actually touring after the course, e.g. telling more experienced touring partners that they were uncomfortable with the decisions being made.

5.3 How do participants talk about decision making, risk and learning before and after the course?

Both before and after the course, participants describe their approach to risk in terms of their values or previous experience, rather than an objective measure. In terms of decision making, participants question their ability to make the right choices, but they still express the desire to test their newfound ability, and they are confident in regard to planning and executing a tour. Those who did not tour after the course expressed high confidence in their ability to do so.

5.4 What is the function of the Level 1?

Participants approach the Level 1 as a kind of gateway; they readily comment that they are taking the course in order to get into more terrain, to meet people and to expand their social relationships within the backcountry community. Participants also express a great deal of confidence in what they believed the Level 1 confers, some even stating that they would not tour with individuals who have not taken the course.

5.5 *Cognitive Map*

The following cognitive map captures a visual representation of the learning process emergent in participants' description of the course (see Figure 1).
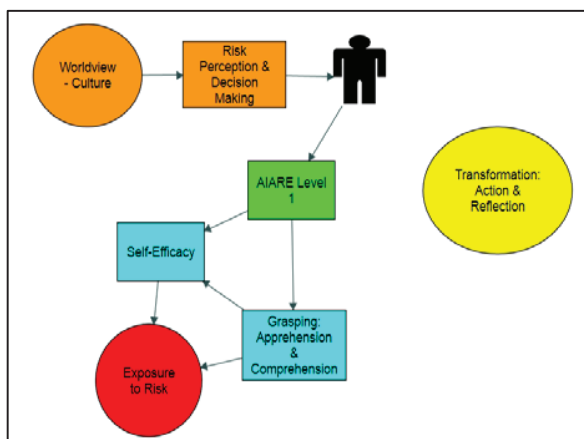

Figure 1: Cognitive map of participants' learning process in an AIARE Level 1.

Figure 1 demonstrates that a breakdown occurs between the grasping and transformative aspects of the experiential learning cycle (Kolb, 2015) and that the culturally and socially defined properties of risk perception are not significantly impacted by the experience of the course. The course imparts skills, abilities and a sense of confidence to plan and execute a tour, but does not appear to transform how participants think about risk and behavior. Participants express this in terms of a duality (e.g., I learned things and had a good experience, but I am not certain I know how make the right decisions).

6. DISCUSSION

Participants approach the AIARE Level 1 as a gateway through which they can establish their social and technical legitimacy as well as access more terrain. The course imparts the feeling of competence and the ability to execute skills, but the course does not necessarily satisfy participants' desire to learn. There is a transformative quality missing; participants express that they need additional experience in order to figure out what they know. This suggests a potential dilemma, one which can be explored by revisiting the underlying theoretical approaches of behavioral economics and ELT.

AIARE's curriculum largely follows a framework for decision making, which aligns with the cognitive model present in behavioral economics. While this is an appealing model for avoiding potential cognitive error, the normative orientation of such an approach, ultimately, is instrumental. Instrumental methods seek to steer the subject. The unease and duality participants experienced with regard to decision making after the Level 1 is perhaps an indication that such an approach can only go so far in terms of developing the ability to analyze phenomena and exercise judgment in novel and unpredictable settings. This raises the question as to whether or not the underlying cognitive model within behavioral economics is an appropriate theoretical framework for avalanche education.

While study participants felt that the main takeaway of the course was planning and using the decision making framework, they also reported that the activities they found to be the most valuable were those that incorporated exchange with the instructor and the opportunity to experience an activity or make a decision with input (e.g. touring and engaging in discussion while on the tour; digging a pit and analyzing the snow). The fact that the experiences that students valued did not line up with what they felt the class was about is reflective of the overall dilemma. In an experiential learning environment, process and content are one in the same; there is no steering. Rather, students and educators engage one another in an exploration of content linked to experience whereby students gain the ability to analyze future experiences and critically engage their environments. (Dewey, 1938; Kolb, 2015; Schumann & Millard, 2012). Students were perhaps expressing a preference for an ELT-based model in their assessment of the course.

In line with previous research (McCammon, 2000, 2004), this study suggests that participants emerge from the Level 1 with increased skills and confidence but perhaps lacking the ability to transform information into knowledge and further suggests that the cognitive model, based in behavioral economics and the well-know "human factor", is perhaps an incomplete theoretical framework with which to approach backcountry education.

7. CONCLUSION

The AIARE Level 1 course holds a formidable place in backcountry culture. AIARE is the leading provider of avalanche education curriculum in the U.S., and the Level 1 is often the first certification that professionals and recreationists obtain. One of AIARE's founding objectives, to create more consistency in avalanche education (AIARE, n.d.), has certainly been realized, but more challenges have arisen. It is critical, perhaps especially because of how indelible the AIARE Level 1 is, that we engage in rigorous study to better understand the theory and practice of avalanche education. What are the

underlying assumptions and how do they impact student experience and subsequent behavior in the backcountry?

This study reveals a duality within students' experience of the course. Participants talk about the confidence, skills and awareness they gained, but explain that they need more experience in order to understand what they learned. They realize they were taught a decision making framework, but they value interacting with the guide while touring the most. Their relationship with risk in regard to the backcountry was difficult to explain, so they rely on their values and worldview to explain it. In locating this duality within a larger theoretical framework, it is apparent that participants of this study experienced the Level 1 as an instrument from which they gained information and an overall positive experience, but that this was actually a dilemma of sorts, as participants value experiential learning and inquiry and express a consistent desire and need for more experience before they could "know" anything.

The AIARE Level 1 is a valuable and influential institution within the backcountry community, and, because of this, it is critical that we continue to engage it and other educational interventions in order to explore their purpose and influence on behavior and decision making. Ultimately, this study demonstrates that while participants gain information, tools and credentials, they do not seem to fully engage in a transformative learning experience. In light of this, the expansion of theoretical models with regard to learning and pedagogy represent a critical next step within the field of avalanche education research.

8. FUTURE RESEARCH

Additional research on curriculum and pedagogical practice is especially warranted given current findings in adventure education and this study's results with regard to ELT. Furthermore, it is critical that researchers continue to engage risk perception within avalanche education; students enter and emerge from the class with great difficulty in talking about how they approach risk; why is this?

CONFLICT OF INTEREST

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